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(21) International Application Number: PCT/US98/05663 (22) International Filing Date: 20 March 1998 (20.03.98) (30) Priority Data: 08/854,605 12 May 1997 (12.05.97) US (71) Applicant: BELOIT TECHNOLOGIES, INC. [US/US]; Suite 3001, 3513 Concord Pike, Wilmington, DE 19803 (US). (72) Inventors: NEILL, Eugene, B.; 5973 Hugh Drive, So. Beloit, IL 61080 (US). RYAN, Mark, A.; 4438 East County J, Beloit, WI 53511 (US). (74) Agent: ARCHER, David, A.; Beloit Corporation, One St. Lawrence Avenue, Beloit, WI 53511 (US).	(81) Designated States: CA, DE, FI, GB, JP, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published With international search report.	
(54) Title: A TRAILING ELEMENT DEVICE <div data-bbox="300 1197 1153 1543" data-label="Image"> </div>		
(57) Abstract <p>A trailing element device is disclosed for controlling the magnitude and scale of turbulence of stock flowing through a slice chamber (12) of a headbox of a papermaking machine. The device includes an upstream member (14), the upstream member including a locking portion (16) for locking the upstream member (14) relative to an upstream end (18) of the slice chamber. The upstream member (14) also includes a downstream portion (20) disposed within the slice chamber and downstream relative to the locking portion. An intermediate portion is disposed between the locking portion and the downstream portion (22) and a downstream member (24) is disposed downstream relative to the downstream portion. The downstream member (24) is fusion welded to the downstream portion (22).</p>		

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TITLE: A TRAILING ELEMENT DEVICEBACKGROUND OF THE INVENTIONField of the Invention

The present invention relates to a trailing element device for controlling the magnitude and scale of turbulence of stock flowing through a slice chamber. More specifically, the present invention relates to a trailing element device for controlling the magnitude and scale of turbulence of stock flowing through a slice chamber of a headbox of a papermaking machine.

Information Disclosure Statement

In the papermaking art pressurized stock is ejected from a headbox onto a moving fourdrinier wire so that as water is drained from the stock through the fourdrinier wire, a web of paper is formed on the wire.

In order to control the magnitude and scale of turbulence of the stock flowing through the headbox and particularly the slice chamber thereof, trailing elements or CONVERFLO sheets are anchored at the upstream end of the slice chamber. The arrangement is such that as the stock flows through the slice chamber, the trailing elements are freely suspended within the stock flow being anchored only at the upstream end thereof.

The aforementioned trailing elements are known in the art as CONVERFLO sheets. CONVERFLO is a common law trademark of Beloit Technologies, Inc.

Typically, the trailing elements are fabricated from Lexan sheets and the Lexan sheets are bonded together to form a composite sheet by means of chemical bonding agents. One type of bonding agent or solvent used for joining the Lexan sheets together is methylene chloride. However, methylene chloride is known to be a carcinogen. Consequently, it is desirable to eliminate the use of the aforementioned bonding agents.

Moreover, although the use of methylene chloride has been successful in providing an adequate bonding between the respective Lexan sheets, it has been observed that after a period of a few years, the methylene chloride tends to corrode the Lexan sheet leading to early failure thereof.

Additionally, the various chemicals within the paper stock flow itself have a detrimental effect on the known bonding solvents.

Also, from time to time, a mill will have a scheduled "boil out" in order to clean the headbox.

The aforementioned "boil out" includes filling the headbox including the slice chamber with a caustic cleaning liquid maintained at approximately 140°F for several hours. Typically, the caustic solution has a pH value of at least 13.

Consequently, it has been standard practice for mills to remove the Lexan sheets prior to performing the aforementioned "boil out" operation.

In view of the fact that the removal of the Lexan sheets typically takes one hour and the replacement of the sheets after the "boil out" also involves an hours work, it is evident that the provision of CONVERFLO or

trailing element sheets capable of withstanding a cleaning operation would be of great value.

Although graphite sheets are known to be able to withstand the hostile environment within a slice chamber during a "boil out" operation, such graphite sheets typically cost 10 times as much as the corresponding Lexan sheets.

The present invention overcomes the aforementioned problem by the provision of thermoplastic sheets which are fusion welded together and that are consequently able to withstand the caustic environment involved in a headbox cleaning operation. Also, the thermoplastic sheets are only marginally more expensive than their corresponding sheets fabricated from Lexan.

Therefore, it is the primary objective of the present invention to provide a trailing element device that overcomes the problems associated with prior art trailing elements and which makes a considerable contribution to the art of papermaking.

Another objective of the present invention is the provision of a trailing element device that does not require the use of methylene chloride, a known carcinogen, in the manufacture thereof.

Another objective of the present invention is the provision of a trailing element that is able to withstand the high temperatures and caustic environment typically present during a headbox cleaning operation.

Other objects and advantages of the present invention will be readily apparent to those skilled in the art by a consideration of the detailed

description contained hereinafter taking in conjunction with the annexed drawings.

SUMMARY OF THE INVENTION

The present invention relates to a trailing element device for controlling the magnitude and scale of turbulence of stock flowing through a slice chamber of a headbox of a papermaking machine.

The device includes an upstream member. The upstream member incorporates a locking portion for locking the upstream member relative to an upstream end of the slice chamber.

The upstream member also includes a downstream portion disposed within the slice chamber and downstream relative to locking portion.

An intermediate portion is disposed between the locking portion and the downstream portion.

A downstream member is disposed downstream relative to the downstream portion. The downstream member is fusion welded to the downstream portion.

More particularly, in specific embodiments of the present invention, the upstream and downstream members are of thermoplastic material.

In a specific embodiment of the present invention, the thermoplastic material is either KYNAR 740 or KYNAR 741.

In a preferred embodiment of the present invention, the intermediate portion has a z-direction thickness which is greater than a z-direction thickness of the downstream portion.

Many variations and modifications of the present invention will be readily apparent to those skilled in the art by consideration of the detailed description contained hereinafter taken in conjunction with the annexed drawings. However, such modifications and variations fall within the spirit and scope of the present invention as defined by the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side elevational view showing a portion of a trailing element according to the present invention.

Fig. 2 is a side elevational view showing how the trailing element according to the present invention is fusion welded.

Similar reference characters refer to similar parts throughout the various views of the drawings.

DETAILED DESCRIPTION OF DRAWINGS

Figures 1 and 2 are side elevational views of a trailing element device 10 for controlling the magnitude and the scale of turbulence of stocks flowing through a slice chamber 12 of a headbox of a papermaking machine. The device includes an upstream member generally designated 14.

The upstream member 14 includes a locking portion 16 for locking the upstream member 14 relative to an upstream end 18 of the slice chamber 12.

A downstream portion 20 is disposed within the slice chamber 12 and downstream relative to the locking portion 16.

An intermediate portion 22 is disposed between the locking portion 16 and the downstream portion 20.

Also, a downstream member 24 is disposed downstream relative to the downstream portion 20. The downstream member 24 is fusion welded to the downstream portion 20.

More specifically, the upstream and the downstream members 14 & 24 are of thermoplastic material which may be either KYNAR 740 or KYNAR 741.

As shown in Figs. 1 and 2, the intermediate portion 22 has a z-directional thickness T which is greater than a z-direction thickness T1 of the downstream portion 20.

Fig. 2 shows how the downstream member 24 and the downstream portion 20 are fusion welded together. More specifically, clamps 26 and 28 are disposed adjacent to the downstream member 24 and the downstream portion 20 respectively.

The gripped downstream member 24 and the downstream portion 20 are pushed under pressure against a heated bar 30.

Once heated, the heated bar 30 is lowered as indicated by the arrow 32 and the pieces 20 & 24 are pushed together under high pressure. In order to provide heat for the welding process, the heated bar 30 is then

raised as indicated by arrow 32 to just below the weld area until the weld process is completed.

The weld process is adjustable to optimize the results by varying the heat, the pressure and the weld time. The aforementioned parameters are then controlled using a computer in a closed loop feedback mode.

Moreover, the welding equipment is designed with an open throat which allows unlimited lengths of the parts to be processed.

The present invention provides a unique low cost trailing element device which is capable of withstanding high temperatures and the caustic environment associated with a headbox cleaning operation.

WHAT IS CLAIMED IS:

1. A trailing element device for controlling the magnitude and scale of turbulence of stock flowing through a slice chamber of a headbox of a papermaking machine, said device comprising:
 - an upstream member;
 - said upstream member including:
 - a locking portion for locking said upstream member relative to an upstream end of the slice chamber;
 - a downstream portion disposed within the slice chamber and downstream relative to said locking portion;
 - an intermediate portion disposed between said locking portion and said downstream portion; and
 - a downstream member disposed downstream relative to said downstream portion, said downstream member being fusion welded to said downstream portion.
2. A trailing element device as set forth in claim 1 wherein: said upstream and downstream members are of thermoplastic material.
3. A trailing element device as set forth in claim 2 wherein said thermoplastic material is KYNAR.
4. A trailing element device as set forth in claim 2 wherein said thermoplastic material is KYNAR 740.
5. A trailing element device as set forth in claim 2 wherein said thermoplastic material is KYNAR 741.

6. A trailing element device as set forth in claim 1 wherein said intermediate portion has a z-direction thickness which is greater than a z-direction thickness of said downstream portion.

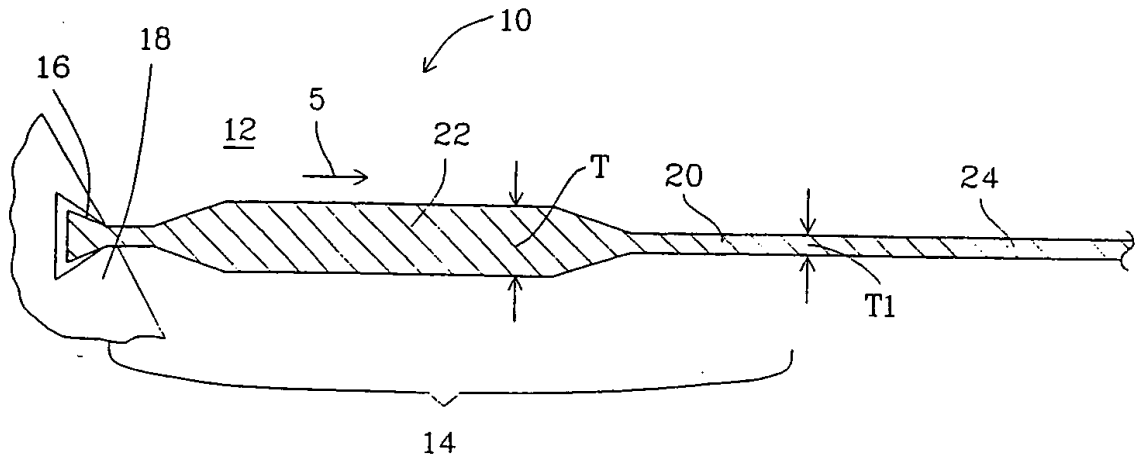


Fig. 1

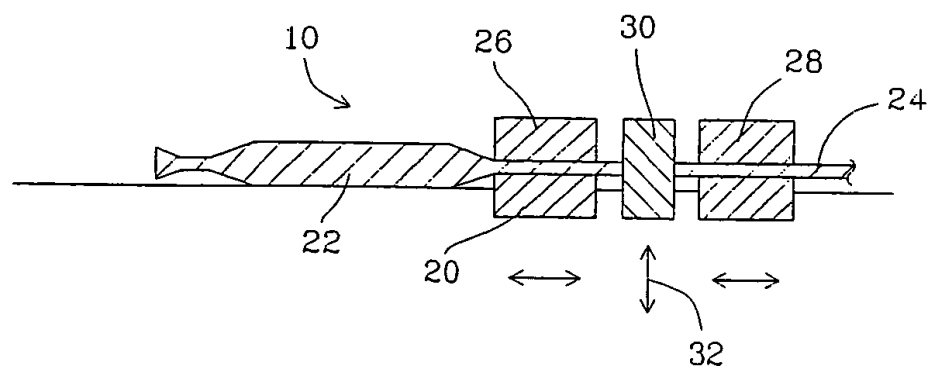


Fig. 2

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 98/05663

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 D21F1/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 D21F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 205 603 A (DIXON ET AL.) 31 May 1974 see page 6, line 7 - line 12; figures 2-4	1,2,6
A	US 3 853 697 A (PARKER J ET AL) 10 December 1974	
A	EP 0 681 057 A (VOITH SULZER PAPIERMASCH GMBH) 8 November 1995	
A	EP 0 147 350 A (BELOIT CORP) 3 July 1985	
A	US 5 545 294 A (LINDEN ANDERS TOMMY ET AL) 13 August 1996	
A	US 4 812 209 A (KINZLER GERNOT ET AL) 14 March 1989	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

In tional Application No
PCT/US 98/05663

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2205603 A	31-05-1974	US 3888729 A	10-06-1975
		AR 199318 A	23-08-1974
		BE 806590 A	15-02-1974
		CA 980156 A	23-12-1975
		CH 576554 A	15-06-1976
		DE 2354426 A	30-05-1974
		GB 1443540 A	21-07-1976
		NL 7314912 A,B	08-05-1974
		SE 403917 B	11-09-1978
		ZA 7308504 A	25-09-1974
US 3853697 A	10-12-1974	CA 1009486 A	03-05-1977
		GB 1456573 A	24-11-1976
		JP 906087 C	18-04-1978
		JP 49124306 A	28-11-1974
		JP 52033202 B	26-08-1977
EP 0681057 A	08-11-1995	NONE	
EP 0147350 A	03-07-1985	AU 570746 B	24-03-1988
		AU 3564284 A	30-05-1985
		BR 8405925 A	10-09-1985
		CA 1230251 A	15-12-1987
		FI 844059 A,B	26-05-1985
		IN 162165 A	09-04-1988
		JP 1381540 C	09-06-1987
		JP 60134093 A	17-07-1985
		JP 61046597 B	15-10-1986
		US 4617091 A	14-10-1986
US 5545294 A	13-08-1996	SE 501798 C	15-05-1995
		AT 163454 T	15-03-1998
		DE 69408680 D	02-04-1998
		EP 0719360 A	03-07-1996
		JP 9502773 T	18-03-1997
		SE 9302980 A	14-03-1995
US 4812209 A	14-03-1989	WO 9508023 A	23-03-1995
		DE 3607306 A	10-09-1987
		AT 388580 B	25-07-1989

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. l. Application No

PCT/US 98/05663

Patent document cited in search report	Publication date	Patent family member(s),	Publication date
US 4812209 A		CA 1272054 A	31-07-1990
		FI 870738 A,B	07-09-1987
		FR 2595382 A	11-09-1987
		GB 2187485 A,B	09-09-1987
		JP 62215087 A	21-09-1987
		SE 466460 B	17-02-1992
		SE 8700839 A	07-09-1987
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